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New York University, NYU Ada/Ed, Version 1.10, Wright-Patterson AFB, Sun-3/60 under Sun UNIX, Version 4.2, Release 3.4 (Host & Target), ACVC 1.10.

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Ada   COMPILER
VALIDATION SUMMARY REPORT:
Certificate Number: 890523W1.10085
New York University
NYU Ada/Ed, Version 1.10
Sun-3/60

Completion of On-Site Testing:
22 May 1989

Prepared By:
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Prepared For:
Ada Joint Program Office
United States Department of Defense
Washington DC 20301-3081

Ada Compiler Validation Summary Report:

Compiler Name: NYU Ada/Ed, Version 1.10

Certificate Number: 890523W1.10085

Host: Sun-3/60 under
          Sun UNIX, Version 4.2 Release 3.4
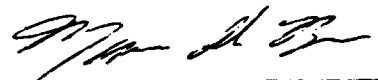
Target: Sun-3/60 under
          Sun UNIX, Version 4.2 Release 3.4

Testing Completed 22 May 1989 Using ACVC 1.10

This report has been reviewed and is approved.

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CHAPTER 1

INTRODUCTION

This Validation Summary Report (VSR) describes the extent to which a
specific Ada compiler conforms to the Ada Standard, ANSI/MIL-STD-1815A.
This report explains all technical terms used within it and thoroughly
reports the results of testing this compiler using the Ada Compiler
Validation Capability (ACVC). An Ada compiler must be implemented
according to the Ada Standard, and any implementation-dependent features
must conform to the requirements of the Ada Standard. The Ada Standard
must be implemented in its entirety, and nothing can be implemented that is
not in the Standard.

Even though all validated Ada compilers conform to the Ada Standard, it
must be understood that some differences do exist between implementations.
The Ada Standard permits some implementation dependencies--for example, the
maximum length of identifiers or the maximum values of integer types.
Other differences between compilers result from the characteristics of
particular operating systems, hardware, or implementation strategies. All
the dependencies observed during the process of testing this compiler are
given in this report.

The information in this report is derived from the test results produced
during validation testing. The validation process includes submitting a
suite of standardized tests, the ACVC, as inputs to an Ada compiler and
evaluating the results. The purpose of validating is to ensure conformity
of the compiler to the Ada Standard by testing that the compiler properly
implements legal language constructs and that it identifies and rejects
illegal language constructs. The testing also identifies behavior that is
implementation-dependent but is permitted by the Ada Standard. Six classes
of tests are used. These tests are designed to perform checks at compile
time, at link time, and during execution.

INTRODUCTION

1.1 PURPOSE OF THIS VALIDATION SUMMARY REPORT

This VSR documents the results of the validation testing performed on an Ada compiler. Testing was carried out for the following purposes:

- To attempt to identify any language constructs supported by the compiler that do not conform to the Ada Standard

- To attempt to identify any language constructs not supported by the compiler but required by the Ada Standard

- To determine that the implementation-dependent behavior is allowed by the Ada Standard

Testing of this compiler was conducted by the AVF according to procedures established by the Ada Joint Program Office and administered by the Ada Validation Organization (AVO). On-site testing was completed 22 May 1989 at New York NY.

1.2 USE OF THIS VALIDATION SUMMARY REPORT

Consistent with the national laws of the originating country, the AVO may make full and free public disclosure of this report. In the United States, this is provided in accordance with the "Freedom of Information Act" (5 U.S.C.#552). The results of this validation apply only to the computers, operating systems, and compiler versions identified in this report.

The organizations represented on the signature page of this report do not represent or warrant that all statements set forth in this report are accurate and complete, or that the subject compiler has no nonconformities to the Ada Standard other than those presented. Copies of this report are available to the public from:

        Ada Information Clearinghouse
        Ada Joint Program Office
        OUSDRE
        The Pentagon, Rm 3D-139 (Fern Street)
        Washington DC   20301-3081

or from:

        Ada Validation Facility
        ASD/SCEL
        Wright-Patterson AFB OH 45433-6503

Questions regarding this report or the validation test results should be directed to the AVF listed above or to:

> Ada Validation Organization
> Institute for Defense Analyses
> 1801 North Beauregard Street
> Alexandria VA 22311

1.3 REFERENCES

1. Reference Manual for the Ada Programming Language, ANSI/MIL-STD-1815A, February 1983 and ISO 8652-1987.

2. Ada Compiler Validation Procedures and Guidelines, Ada Joint Program Office, 1 January 1987.

3. Ada Compiler Validation Capability Implementers' Guide, SofTech, Inc., December 1986.

4. Ada Compiler Validation Capability User's Guide, December 1986.

1.4 DEFINITION OF TERMS

ACVC   The Ada Compiler Validation Capability. The set of Ada programs that tests the conformity of an Ada compiler to the Ada programming language.

Ada   An Ada Commentary contains all information relevant to the
Commentary   point addressed by a comment on the Ada Standard. These comments are given a unique identification number having the form AI-ddddd.

Ada Standard ANSI/MIL-STD-1815A, February 1983 and ISO 8652-1987.

Applicant   The agency requesting validation.

AVF   The Ada Validation Facility. The AVF is responsible for conducting compiler validations according to procedures contained in the Ada Compiler Validation Procedures and Guidelines.

AVO   The Ada Validation Organization. The AVO has oversight authority over all AVF practices for the purpose of maintaining a uniform process for validation of Ada compilers. The AVO provides administrative and technical support for Ada validations to ensure consistent practices.

INTRODUCTION

Compiler   A processor for the Ada language. In the context of this
               report, a compiler is any language processor, including
               cross-compilers, translators, and interpreters.

Failed test   An ACVC test for which the compiler generates a result that
               demonstrates nonconformity to the Ada Standard.

Host   The computer on which the compiler resides.

Inapplicable   An ACVC test that uses features of the language that a
test   compiler is not required to support or may legitimately
               support in a way other than the one expected by the test.

Passed test   An ACVC test for which a compiler generates the expected
               result.

Target   The computer for which a compiler generates code.

Test   A program that checks a compiler's conformity regarding a
               particular feature or a combination of features to the Ada
               Standard. In the context of this report, the term is used to
               designate a single test, which may comprise one or more
               files.

Withdrawn   An ACVC test found to be incorrect and not used to check
test   conformity to the Ada Standard. A test may be incorrect
               because it has an invalid test objective, fails to meet its
               test objective, or contains illegal or erroneous use of the
               language.

1.5 ACVC TEST CLASSES

Conformity to the Ada Standard is measured using the ACVC. The ACVC
contains both legal and illegal Ada programs structured into six test
classes: A, B, C, D, E, and L. The first letter of a test name identifies
the class to which it belongs. Class A, C, D, and E tests are executable,
and special program units are used to report their results during
execution. Class B tests are expected to produce compilation errors.
Class L tests are expected to produce compilation or link errors because of
the way in which a program library is used at link time.

Class A tests ensure the successful compilation of legal Ada programs with
certain language constructs which cannot be verified at compile time.
There are no explicit program components in a Class A test to check
semantics. For example, a Class A test checks that reserved words of
another language (other than those already reserved in the Ada language)
are not treated as reserved words by an Ada compiler. A Class A test is
passed if no errors are detected at compile time and the program executes
to produce a PASSED message.

Class B tests check that a compiler detects illegal language usage. Class B tests are not executable. Each test in this class is compiled and the resulting compilation listing is examined to verify that every syntax or semantic error in the test is detected. A Class B test is passed if every illegal construct that it contains is detected by the compiler.

Class C tests check the run time system to ensure that legal Ada programs can be correctly compiled and executed. Each Class C test is self-checking and produces a PASSED, FAILED, or NOT APPLICABLE message indicating the result when it is executed.

Class D tests check the compilation and execution capacities of a compiler. Since there are no capacity requirements placed on a compiler by the Ada Standard for some parameters--for example, the number of identifiers permitted in a compilation or the number of units in a library--a compiler may refuse to compile a Class D test and still be a conforming compiler. Therefore, if a Class D test fails to compile because the capacity of the compiler is exceeded, the test is classified as inapplicable. If a Class D test compiles successfully, it is self-checking and produces a PASSED or FAILED message during execution.

Class E tests are expected to execute successfully and check implementation-dependent options and resolutions of ambiguities in the Ada Standard. Each Class E test is self-checking and produces a NOT APPLICABLE, PASSED, or FAILED message when it is compiled and executed. However, the Ada Standard permits an implementation to reject programs containing some features addressed by Class E tests during compilation. Therefore, a Class E test is passed by a compiler if it is compiled successfully and executes to produce a PASSED message, or if it is rejected by the compiler for an allowable reason.

Class L tests check that incomplete or illegal Ada programs involving multiple, separately compiled units are detected and not allowed to execute. Class L tests are compiled separately and execution is attempted. A Class L test passes if it is rejected at link time--that is, an attempt to execute the main program must generate an error message before any declarations in the main program or any units referenced by the main program are elaborated. In some cases, an implementation may legitimately detect errors during compilation of the test.

Two library units, the package REPORT and the procedure CHECK_FILE, support the self-checking features of the executable tests. The package REPORT provides the mechanism by which executable tests report PASSED, FAILED, or NOT APPLICABLE results. It also provides a set of identity functions used to defeat some compiler optimizations allowed by the Ada Standard that would circumvent a test objective. The procedure CHECK_FILE is used to check the contents of text files written by some of the Class C tests for chapter 14 of the Ada Standard. The operation of REPORT and CHECK_FILE is checked by a set of executable tests. These tests produce messages that are examined to verify that the units are operating correctly. If these units are not operating correctly, then the validation is not attempted.

INTRODUCTION

The text of each test in the ACVC follows conventions that are intended to ensure that the tests are reasonably portable without modification. For example, the tests make use of only the basic set of 55 characters, contain lines with a maximum length of 72 characters, use small numeric values, and place features that may not be supported by all implementations in separate tests. However, some tests contain values that require the test to be customized according to implementation-specific values--for example, an illegal file name. A list of the values used for this validation is provided in Appendix C.

A compiler must correctly process each of the tests in the suite and demonstrate conformity to the Ada Standard by either meeting the pass criteria given for the test or by showing that the test is inapplicable to the implementation. The applicability of a test to an implementation is considered each time the implementation is validated. A test that is inapplicable for one validation is not necessarily inapplicable for a subsequent validation. Any test that was determined to contain an illegal language construct or an erroneous language construct is withdrawn from the ACVC and, therefore, is not used in testing a compiler. The tests withdrawn at the time of this validation are given in Appendix D.

CHAPTER 2

CONFIGURATION INFORMATION

2.1 CONFIGURATION TESTED

The candidate compilation system for this validation was tested under the following configuration:

Compiler: NYU Ada/Ed, Version 1.10

ACVC Version: 1.10

Certificate Number: 890523W1.10085

Host Computer:

Machine:	Sun-3/60
Operating System:	Sun UNIX Version 4.2 Release 3.4
Memory Size:	16 Megabytes

Target Computer:

Machine:	Sun-3/60
Operating System:	Sun UNIX Version 4.2 Release 3.4
Memory Size:	16 Megabytes

2.2 IMPLEMENTATION CHARACTERISTICS

One of the purposes of validating compilers is to determine the behavior of a compiler in those areas of the Ada Standard that permit implementations to differ. Class D and E tests specifically check for such implementation differences. However, tests in other classes also characterize an implementation. The tests demonstrate the following characteristics:

a. Capacities.

   (1) The compiler correctly processes a compilation containing 723 variables in the same declarative part. (See test D29002K.)

   (2) The compiler correctly processes tests containing loop statements nested to 65 levels. (See tests D55A03A..H (8 tests).)

   (3) The compiler correctly processes tests containing block statements nested to 65 levels. (See test D56001B.)

   (4) The compiler correctly processes tests containing recursive procedures separately compiled as subunits nested to six levels. (See tests D64005E..G (3 tests).)

b. Predefined types.

   (1) This implementation supports the additional predefined type LONG_FLOAT in the package STANDARD. (See tests B86001T..Z (7 tests).)

c. Expression evaluation.

   The order in which expressions are evaluated and the time at which constraints are checked are not defined by the language. While the ACVC tests do not specifically attempt to determine the order of evaluation of expressions, test results indicate the following:

   (1) Some of the default initialization expressions for record components are evaluated before any value is checked for membership in a component's subtype. (See test C32117A.)

   (2) Assignments for subtypes are performed with the same precision as the base type. (See test C35712B.)

   (3) This implementation uses no extra bits for extra precision and uses no extra bits for extra range. (See test C35903A.)

(4) Sometimes CONSTRAINT_ERROR is raised when an integer literal operand in a comparison or membership test is outside the range of the base type. (See test C45232A.)

(5) No exception is raised when a literal operand in a fixed-point comparison or membership test is outside the range of the base type. (See test C45252A.)

(6) Underflow is not gradual. (See tests C45524A..Z.)

d. Rounding.

The method by which values are rounded in type conversions is not defined by the language. While the ACVC tests do not specifically attempt to determine the method of rounding, the test results indicate the following:

(1) The method used for rounding to integer is round away from zero. (See tests C46012A..Z.)

(2) The method used for rounding to longest integer is round away from zero. (See tests C46012A..Z.)

(3) The method used for rounding to integer in static universal real expressions is round away from zero. (See test C4A014A.)

e. Array types.

An implementation is allowed to raise NUMERIC_ERROR or CONSTRAINT_ERROR for an array having a 'LENGTH that exceeds STANDARD.INTEGER'LAST and/or SYSTEM.MAX_INT.

For this implementation:

(1) Declaration of an array type or subtype declaration with more than SYSTEM.MAX_INT components raises no exception. (See test C36003A.)

(2) No exception is raised when 'LENGTH is applied to a null array type with INTEGER'LAST + 2 components. (See test C36202A.)

(3) No exception is raised when 'LENGTH is applied to a null array type with SYSTEM.MAX_INT + 2 components. (See test C36202B.)

(4) A packed BOOLEAN array having a 'LENGTH exceeding INTEGER'LAST raises STORAGE_ERROR when the array objects are declared. (See test C52103X.)

(5) A packed two-dimensional BOOLEAN array with more than INTEGER'LAST components raises STORAGE_ERROR when the array objects are declared. (See test C52104Y.)

(6) A null array with one dimension of length greater than INTEGER'LAST may raise NUMERIC_ERROR or CONSTRAINT_ERROR either when declared or assigned. Alternatively, an implementation may accept the declaration. However, lengths must match in array slice assignments. This implementation raises no exception. (See test E52103Y.)

(7) In assigning one-dimensional array types, the expression is evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)

(8) In assigning two-dimensional array types, the expression is not evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)

f. Discriminated types.

(1) *In assigning* record types with discriminants, the expression is evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)

g. Aggregates.

(1) In the evaluation of a multi-dimensional aggregate, index subtype checks are made as choices are evaluated. (See tests C43207A and C43207B.)

(2) In the evaluation of an aggregate containing subaggregates, all choices are evaluated before being checked for identical bounds. (See test E43212B.)

(3) CONSTRAINT_ERROR is raised after all choices are evaluated when a bound in a non-null range of a non-null aggregate does not belong to an index subtype. (See test E43211B.)

h. Pragmas.

(1) The pragma INLINE is not supported for functions or procedures. (See tests LA3004A..B, EA3004C..D, and CA3004E..F.)

i. Generics

(1) Generic specifications and bodies can be compiled in separate compilations. (See tests CA1012A, CA2009C, CA2009F, BC3204C, and BC3205D.)

(2) Generic unit bodies and their subunits can be compiled in separate compilations. (See test CA3011A.)

j. Input and output

(1) The package SEQUENTIAL_IO can be instantiated with unconstrained array types and record types with discriminants without defaults. (See tests AE2101C, EE2201D, and EE2201E.)

(2) The package DIRECT_IO can be instantiated with unconstrained array types and record types with discriminants without defaults. (See tests AE2101H, EE2401D, and EE2401G.)

(3) Modes IN_FILE and OUT_FILE are supported for SEQUENTIAL_IO. (See tests CE2102D..E, CE2102N, and CE2102P.)

(4) Modes IN_FILE, OUT_FILE, and INOUT_FILE are supported for DIRECT_IO. (See tests CE2102F, CE2102I..J, CE2102R, CE2102T, and CE2102V.)

(5) Modes IN_FILE and OUT_FILE are supported for text files. (See tests CE3102E and CE3102I..K.)

(6) RESET and DELETE operations are supported for SEQUENTIAL_IO. (See tests CE2102G and CE2102X.)

(7) RESET and DELETE operations are supported for DIRECT_IO. (See tests CE2102K and CE2102Y.)

(8) RESET and DELETE operations are supported for text files. (See tests CE3102F..G, CE3104C, CE3110A, and CE3114A.)

(9) Overwriting to a sequential file truncates to the last element written. (See test CE2208B.)

(10) Temporary sequential files are given names and not deleted when closed. (See test CE2108A.)

(11) Temporary direct files are given names and not deleted when closed. (See test CE2108C.)

(12) Temporary text files are given names and not deleted when closed. (See test CE3112A.)

CONFIGURATION INFORMATION

(13) Only one internal file can be associated with each external file 'for sequential files. (See tests CE2107A..E, CE2102L, CE2110B, and CE2111D.)

(14) Only one internal file can be associated with each external file for direct files. (See tests CE2107F..H (3 tests), CE2110D and CE2111H.)

(15) Only one internal file can be associated with each external file for text files. (See tests CE3111A..E, CE3114B, and CE3115A.)

CHAPTER 3

TEST INFORMATION

3.1 TEST RESULTS

Version 1.10 of the ACVC comprises 3717 tests. When this compiler was tested, 44 tests had been withdrawn because of test errors. The AVF determined that 195 tests were inapplicable to this implementation. All inapplicable tests were processed during validation testing. Modifications to the code, processing, or grading for 19 tests were required to successfully demonstrate the test objective. (See section 3.6.)

The AVF concludes that the testing results demonstrate acceptable conformity to the Ada Standard.

3.2 SUMMARY OF TEST RESULTS BY CLASS

RESULT	TEST CLASS						TOTAL
	A	B	C	D	E	L	
Passed	129	1128	2136	15	26	44	3478
Inapplicable	0	10	179	2	2	2	195
Withdrawn	1	2	35	0	6	0	44
TOTAL	130	1140	2350	17	34	46	3717

TEST INFORMATION

3.3 SUMMARY OF TEST RESULTS BY CHAPTER

RESULT						CHAPTER								TOTAL
	2	3	4	5	6	7	8	9	10	11	12	13	14	
Passed	194	648	645	242	170	99	160	331	131	36	252	289	281	3478
Inappl	18	1	35	6	2	0	6	1	6	0	0	80	40	195
Wdrn	1	1	0	0	0	0	0	2	0	0	1	35	4	44
TOTAL	213	650	680	248	172	99	166	334	137	36	253	404	325	3717

3.4 WITHDRAWN TESTS

The following 44 tests were withdrawn from ACVC Version 1.10 at the time of this validation:

E28005C	A39005G	B97102E	C97116A	BC3009B	CD2A62D
CD2A63A	CD2A63B	CD2A63C	CD2A63D	CD2A66A	CD2A66B
CD2A66C	CD2A66D	CD2A73A	CD2A73B	CD2A73C	CD2A73D
CD2A76A	CD2A76B	CD2A76C	CD2A76D	CD2A81G	CD2A83G
CD2A84M	CD2A84N	CD2B15C	CD2D11B	CD5007B	CD50110
ED7004B	ED7005C	ED7005D	ED7006C	ED7006D	CD7105A
CD7203B	CD7204B	CD7205C	CD7205D	CE2107I	CE3111C
CE3301A	CE3411B				

See Appendix D for the reason that each of these tests was withdrawn.

3.5 INAPPLICABLE TESTS

Some tests do not apply to all compilers because they make use of features that a compiler is not required by the Ada Standard to support. Others may depend on the result of another test that is either inapplicable or withdrawn. The applicability of a test to an implementation is considered each time a validation is attempted. A test that is inapplicable for one validation attempt is not necessarily inapplicable for a subsequent attempt. For this validation attempt, 195 tests were inapplicable for the reasons indicated:

a. C24113H..Y (18 tests) are not applicable because the source line exceeds the maximum of 120 characters.

b. C35702A and B86001T are not applicable because this implementation supports no predefined type SHORT_FLOAT.

c. The following 16 tests are not applicable because this implementation does not support a predefined type SHORT_INTEGER:

C45231B	C45304B	C45502B	C45503B	C45504B
C45504E	C45611B	C45613B	C45614B	C45631B
C45632B	B52004E	C55B07B	B55B09D	B86001V
CD7101E				

d. The following 16 tests are not applicable because this implementation does not support a predefined type LONG_INTEGER:

C45231C	C45304C	C45502C	C45503C	C45504C
C45504F	C45611C	C45613C	C45614C	C45631C
C45632C	B52004D	C55B07A	B55B09C	B86001W
CD7101F				

e. C45231D, B86001X, and CD7101G are not applicable because this implementation does not support any predefined integer type with a name other than INTEGER, LONG_INTEGER, or SHORT_INTEGER.

f. C45531K..L (2 tests) and C45532K..L (2 tests) are not applicable because the value of SYSTEM.MAX_MANTISSA is less than 32.

g. C45531M..P (4 tests) and C45532M..P (4 tests) are not applicable because the value of SYSTEM.MAX_MANTISSA is less than 47.

h. D64005F and D64005G are not applicable because this implementation does not support nesting 10 levels of recursive procedure calls.

i. B86001Y is not applicable because this implementation supports no predefined fixed-point type other than DURATION.

j. B86001Z is not applicable because this implementation supports no predefined floating-point type with a name other than FLOAT, LONG_FLOAT, or SHORT_FLOAT.

k. C96005B is not applicable because there are no values of type DURATION'BASE that are outside the range of DURATION.

l. LA3004A, LA3004B, EA3004C, EA3004D, CA3004E, and CA3004F are not applicable because this implementation does not support pragma INLINE.

m. CD2B15B is not applicable because collection size allocated is larger than size specified.

n. The following 76 tests are not applicable because, for this implementation, address clauses are not supported.

CD5003B..I	CD5011A..I	CD5011K..N	CD5011Q..S
CD5012A..J	CD5012L..M	CD5013A..I	CD5013K..O
CD5013R..S	CD5014A..O	CD5014R..Z	

TEST INFORMATION

o. CE2102D is inapplicable because this implementation supports CREATE with IN_FILE mode for SEQUENTIAL_IO.

p. CE2102E is inapplicable because this implementation supports CREATE with OUT_FILE mode for SEQUENTIAL_IO.

q. CE2102F is inapplicable because this implementation supports CREATE with INOUT_FILE mode for DIRECT_IO.

r. CE2102I is inapplicable because this implementation supports CREATE with IN_FILE mode for DIRECT_IO.

s. CE2102J is inapplicable because this implementation supports CREATE with OUT_FILE mode for DIRECT_IO.

t. CE2102N is inapplicable because this implementation supports OPEN with IN_FILE mode for SEQUENTIAL_IO.

u. CE21020 is inapplicable because this implementation supports RESET with IN_FILE mode for SEQUENTIAL_IO.

v. CE2102P is inapplicable because this implementation supports OPEN with OUT_FILE mode for SEQUENTIAL_IO.

w. CE2102Q is inapplicable because this implementation supports RESET with OUT_FILE mode for SEQUENTIAL_IO.

x. CE2102R is inapplicable because this implementation supports OPEN with INOUT_FILE mode for DIRECT_IO.

y. CE2102S is inapplicable because this implementation supports RESET with INOUT_FILE mode for DIRECT_IO.

z. CE2102T is inapplicable because this implementation supports OPEN with IN_FILE mode for DIRECT_IO.

aa. CE2102U is inapplicable because this implementation supports RESET with IN_FILE mode for DIRECT_IO.

ab. CE2102V is inapplicable because this implementation supports open with OUT_FILE mode for DIRECT_IO.

ac. CE2102W is inapplicable because this implementation supports RESET with OUT_FILE mode for DIRECT_IO.

ad. CE2107A..E (5 tests), CE2107L, CE2110B, and CE2111D are not applicable because multiple internal files cannot be associated with the same external file for sequential files. The proper exception is raised when multiple access is attempted.

ae. CE2107F..Ħ (3 tests), CE2110D, and CE2111H are not applicable because multiple internal files cannot be associated with the same external file for direct files. The proper exception is raised when multiple access is attempted.

af. CE3102E is inapplicable because this implementation supports CREATE with IN_FILE mode for text files.

ag. CE3102F is inapplicable because this implementation supports RESET for text files.

ah. CE3102G is inapplicable because this implementation supports deletion of an external file for text files.

ai. CE3102I is inapplicable because this implementation supports CREATE with OUT_FILE mode for text files.

aj. CE3102J is inapplicable because this implementation supports OPEN with IN_FILE mode for text files.

ak. CE3102K is inapplicable because this implementation supports OPEN with OUT_FILE mode for text files.

al. CE3111A..B (2 tests), CE3111D..E (2 tests), CE3114B, and CE3115A are not applicable because multiple internal files cannot be associated with the same external file for text files. The proper exception is raised when multiple access is attempted.

3.6 TEST, PROCESSING, AND EVALUATION MODIFICATIONS

It is expected that some tests will require modifications of code, processing, or evaluation in order to compensate for legitimate implementation behavior. Modifications are made by the AVF in cases where legitimate implementation behavior prevents the successful completion of an (otherwise) applicable test. Examples of such modifications include: adding a length clause to alter the default size of a collection; splitting a Class B test into subtests so that all errors are detected; and confirming that messages produced by an executable test demonstrate conforming behavior that wasn't anticipated by the test (such as raising one exception instead of another).

Modifications were required for 19 tests.

The following tests were split because syntax errors at one point resulted in the compiler not detecting other errors in the test:

B49003A	B49005A	B84004A	B91003A	B91003C	BD5005B
BE3001A	BE3002A				

The following modifications were made to compensate for legitimate implementation behavior.

B22005I, B25002A, B26005A, and B27005A (4 tests) were modified to remove the nul character, because the UNIX SETL system ignores a nul character and the remainder of the line containing it.

C45651A was modified because membership test uses an upper bound that may be greater than DECIMAL_M4'BASE'LAST. On line 256, the value 1024.0 was replaced by 979.0.

CC3126A was modified because an uninitialized string variable raises PROGRAM_ERROR. The initializing expression ":= (OTHERS => 'B')" was inserted into variable B's declaration on line 117.

CD2A31A, CD2A32A, and CD2A32E (3 tests) were modified to reduce the number of iterations in each of four "for loops" from 201 to 2 so as to compensate for the SETL implementation's extraordinary consumption of space and time in the execution of these tests. The AVO approved these modifications in preference to effectively forcing the implementation to be changed so that SIZE length clauses were not supported at all. Other tests in these two series contain a single, similar loop; they were successfully processed in approximately an hour each.

CD2C11A..B (2 tests) were modified because this implementation raises PROGRAM_ERROR when procedure TEST_TASK is called with an uninitialized actual parameter, W. The initializing expression ":= 5.0" was inserted into variable W's declaration on line 41 and 44 respectively.

3.7 ADDITIONAL TESTING INFORMATION

3.7.1 Prevalidation

Prior to validation, a set of test results for ACVC Version 1.10 produced by the NYU Ada/Ed was submitted to the AVF by the applicant for review. Analysis of these results demonstrated that the compiler successfully passed all applicable tests, and the compiler exhibited the expected behavior on all inapplicable tests.

3.7.2 Test Method

Testing of the NYU Ada/Ed compiler using ACVC Version 1.10 was conducted on-site by a validation team from the AVF. The configuration in which the testing was performed is described by the following designations of hardware and software components:

Host computer:	Sun-3/60
Host operating system:	Sun UNIX, Version 4.2 Release 3.4
Target computer:	Sun-3/60
Target operating system:	Sun UNIX, Version 4.2 Release 3.4
Compiler:	NYU Ada/Ed, Version 1.10

A magnetic tape containing all tests except for withdrawn tests and tests requiring unsupported floating-point precisions was taken on-site by the validation team for processing. Tests that make use of implementation-specific values were customized before being written to the magnetic tape. Tests requiring modifications during the prevalidation testing were included in their modified form on the magnetic tape.

The contents of the magnetic tape were loaded directly onto the host computer.

After the test files were loaded to disk, the full set of tests was compiled, linked, and all executable tests were run on the Sun-3/60. Results were transferred to a workstation and printed directly onto the host computer.

The compiler was tested using command scripts provided by New York University and reviewed by the validation team. The compiler was tested using all default option settings except for the following:

OPTION	EFFECT
A	Specifies the source file.
L	Specifies the listing file.
LIBFILE	Specifies the program library.
NEWLIB	Specifies that a new program library is to be used.
AISFILE	Specifies the name of the intermediate files.
MAIN	Specifies the name of the main program unit if there can be more than one.
MEMORY_SIZE	Specifies the maximum memory to be used.

Tests were compiled, linked, and executed (as appropriate) using 3 computers. Test output, compilation listings, and job logs were captured on magnetic tape and archived at the AVF. The listings examined on-site by the validation team were also archived.

TEST INFORMATION

3.7.3 Test Site

Testing was conducted at New York NY and was completed on 22 May 1989.

APPENDIX A

DECLARATION OF CONFORMANCE

New York University has submitted the following
Declaration of Conformance concerning the NYU Ada/Ed
Compiler.

DECLARATION OF CONFORMANCE

Compiler Implementor: New York University
Ada Validation Facility: ASD/SCEL, Wright-Patterson AFB OH 45433-6503
Ada Compiler Validation Capability (ACVC) Version: 1.10

Base Configuration

Base Compiler Name: NYU Ada/Ed   Version: 1.10
Host Architecture ISA: Sun-3/60   OS&VER: Sun UNIX 4.2 Rel 3.4
Target Architecture ISA: Sun-3/60   OS&VER: Sun UNIX 4.2 Rel 3.4

Implementor's Declaration

I, the undersigned, representing New York University, have implemented no
deliberate extensions to the Ada Language Standard ANSI/MIL-STD-1815A in the
compiler listed in this declaration. I declare that New York Univesity is the owner of
record of the Ada language compiler listed above and, as such, is responsible for
maintaining said compiler in conformance to ANSI/MIL-STD-1815A. All certificates
and registrations for Ada language compilers listed in this declaration shall be made
only in owner's corporate name.

Bernard Banner   Date:_ 6/12/89 _

New York University
Bernard Banner, Asst Research Scientist

Owner's Declaration

I, the undersigned, representing New York University, take full responsibilty for
implementation and maintenance of the Ada compiler listed above, and agree to the
public disclosure of the final Validation Summary Report. I declare that all of the
Ada language compilers listed, and their host/target performance are in compliance
with the Ada Language Standard ANSI/MIL-STD-1815A.

Bernard Banner   Date:_ 6/12/89 _

New York University
Bernard Banner, Asst Research Scientist

APPENDIX B

APPENDIX F OF THE Ada STANDARD

The only allowed implementation dependencies correspond to
implementation-dependent pragmas, to certain machine-dependent conventions
as mentioned in chapter 13 of the Ada Standard, and to certain allowed
restrictions on representation clauses. The implementation-dependent
characteristics of the NYU Ada/Ed, Version 1.10, as described in this
Appendix, are provided by New York University. Unless specifically noted
otherwise, references in this Appendix are to compiler documentation and
not to this report. Implementation-specific portions of the package
STANDARD, which are not a part of Appendix F, are:


```
package STANDARD is

    ...


    type INTEGER is range -1073741823 .. 1073741823;

    type FLOAT is digits 6 range -1.70141E+38 .. 1.70141E+38;
    type LONG_FLOAT is digits 33
          range -6.70390396497129854978701249910292E+153 ..
                6.70390396497129854978701249910292E+153;

    type DURATION is delta 0.01 range -86400.00 .. 86400.00;


    ...

end STANDARD;
```

Appendix F: Implementation Dependent Characteristics

(1) The form, allowed places, and effect of implementation dependent pragmas.

NYU Ada/Ed does not recognize any implementation dependent pragmas. The language defined pragmas are correctly recognized and their legality is checked, but, with the exception of LIST and PRIORITY, they have no effect on the execution of the program. A warning message is generated to indicate that the pragma is ignored by NYU Ada/Ed.

(2) The name and the type of every implementation dependent attribute.

There are no implementation dependent attributes in NYU Ada/Ed.

(3) The specification of the package system.

```
package SYSTEM is
     type NAME        is (ADA_ED);
     type ADDRESS     is new INTEGER;
     SYSTEM_NAME      : constant  NAME  :=  ADA_ED;
     STORAGE_UNIT     : constant  :=  32;
     MEMORY_SIZE      : constant  :=  2**30 - 1;
     -- System Dependent Named Numbers:
     MIN_INT          : constant  :=  -(2**30 - 1);
     MAX_INT          : constant  :=  2**30 - 1;
     MAX_DIGITS       : constant  :=  33;
     MAX_MANTISSA     : constant  :=  31;
     FINE_DELTA       : constant  :=  2.0 ** (-31);
     TICK             : constant  :=  0.01;
     -- Other System Dependent Declarations
     subtype PRIORITY is INTEGER range 0 .. 9;
     SYSTEM_ERROR  :  exception;
                      -- raised if internal check fails
end SYSTEM;
```

(4) The list of all restrictions on representation clauses.

NYU Ada/Ed does not support any address clauses.

(5) The conventions used for system generated names.

NYU Ada/Ed does not provide any system generated names denoting system dependent entities, since in any case, representation specifications are not permitted.

(6) The interpretation of expressions that appear in address clauses. '

Address expressions in NYU/AdaEd are meaningless, since the model used for interpretation does not use addresses. The ADDRESS type defined in SYSTEM is present only for completeness, and to be able to recognize semantically legal uses of the attribute ADDRESS.

(7) Restrictions on unchecked conversion.

NYU Ada/Ed will correctly recognize and check the validity of any use of unchecked conversion. However, any program which executes an unchecked conversion is considered to be erroneous, and the exception PROGRAM_ERROR will be raised.

(8) Implementation dependent characteristics of the input-output package.

A) Temporary files are fully supported. The naming convention used is as follows:

```
XHHMMSS.TMP
 X stands for the file accessing method
   S - SEQUENTIAL_IO
   D - DIRECT_IO
   T - TEXT_IO
 HH - hour of file creation
 MM - minute of file creation
 SS - second of file creation
```

B) Deletion of files is fully supported.

C) Only one internal file may be associated with the same external file (No multiple accessing of files allowed).

D) File names used in the CREATE and OPEN procedures are standard UNIX file names. The function FORM returns the string given as FORM parameter when a file is created. No system-dependent characteristics are associated with that parameter.

E) A maximum of 17 files can be open at any given time during program execution.

F) The standard default input file may be specified using the DATA parameter of the ADA commands. If a file is specified it must be possible to open it at the beginning of program execution, otherwise the exception PROGRAM_ERROR will be raised. If no file is specified stdin will be used. The standard output file is stdout.

G) SEQUENTIAL_IO and DIRECT_IO support constrained array types, record types without discriminants and record types with discriminants with defaults.

H) I/O on access types is possible, but usage of access values read in another program execution is erroneous.

I) Normal termination of the main program causes all open files to be closed, and all temporary files to be deleted.

J) LOW_LEVEL_IO is not supported.

K) The form feed character (CTRL L - ascii 12) is used as the page terminator indicator. Its use as a data element of a file is therefore undefined.

APPENDIX C

TEST PARAMETERS

Certain tests in the ACVC make use of implementation-dependent values, such as the maximum length of an input line and invalid file names. A test that makes use of such values is identified by the extension .TST in its file name. Actual values to be substituted are represented by names that begin with a dollar sign. A value must be substituted for each of these names before the test is run. The values used for this validation are given below.

Name and Meaning	Value
$ACC_SIZE An integer literal whose value is the number of bits sufficient to hold any value of an access type.	32
$BIG_ID1 An identifier the size of the maximum input line length which is identical to $BIG_ID2 except for the last character.	(1..119 => 'A', 120 => '1')
$BIG_ID2 An identifier the size of the maximum input line length which is identical to $BIG_ID1 except for the last character.	(1..119 => 'A', 120 => '2')
$BIG_ID3 An identifier the size of the maximum input line length which is identical to $BIG_ID4 except for a character near the middle.	(1..59 => 'A', 60 => '3', 61..120 => 'A')

TEST PARAMETERS

Name and Meaning	Value

$BIG_ID4
    An identifier the size of the maximum input line length which is identical to $BIG_ID3 except for a character near the middle.
	(1..59 => 'A', 60 => '4',
	                 61..120 => 'A')

$BIG_INT_LIT
    An integer literal of value 298 with enough leading zeroes so that it is the size of the maximum line length.
	(1..117 => '0',
	           118..120 => "298")

$BIG_REAL_LIT
    A universal real literal of value 690.0 with enough leading zeroes to be the size of the maximum line length.
	(1..115 => '0',
	        116..120 => "690.0")

$BIG_STRING1
    A string literal which when catenated with $BIG_STRING2 yields the image of $BIG_ID1.
	(1 => '"', 2..61 => 'A',
	              62 => '"')

$BIG_STRING2
    A string literal which when catenated to the end of $BIG_STRING1 yields the image of $BIG_ID1.
	(1 => '"', 2..60 => 'A',
	           61..62 => "1"")

$BLANKS A sequence of blanks twenty characters less than the size of the maximum line length.	(1..100 => ' ')
$COUNT_LAST A universal integer literal whose value is TEXT_IO.COUNT'LAST.	32_767
$DEFAULT_MEM_SIZE An integer literal whose value is SYSTEM.MEMORY_SIZE.	1_073_741_823
$DEFAULT_STOR_UNIT An integer literal whose value is SYSTEM.STORAGE_UNIT.	32

Name and Meaning	Value
$DEFAULT_SYS_NAME 　　The value of the constant 　　SYSTEM.SYSTEM_NAME.	ADA_ED
$DELTA_DOC 　　A real literal whose value is 　　SYSTEM.FINE_DELTA.	(1..18 => "0.000_000_000_465_", 　19..35 => "661_287_307_739_2", 　36..43 => "57_812_5")
$FIELD_LAST 　　A　　universal　　integer 　　literal　whose　value　is 　　TEXT_IO.FIELD'LAST.	100
$FIXED_NAME 　　The　name　of　a　predefined 　　fixed-point　type　other　than 　　DURATION.	NO_SUCH_TYPE_AVAILABLE
$FLOAT_NAME 　　The　name　of　a　predefined 　　floating-point　type　other　than 　　FLOAT,　　　SHORT_FLOAT,　　　or 　　LONG_FLOAT.	NO_SUCH_TYPE_AVAILABLE
$GREATER_THAN_DURATION 　　A　universal　real　literal　that 　　lies between　DURATION'BASE'LAST 　　and　DURATION'LAST　or any value 　　in the range of DURATION.	75_000.0
$GREATER_THAN_DURATION_BASE_LAST 　　A　universal　real　literal　that is 　　greater than DURATION'BASE'LAST.	131_073.0
$HIGH_PRIORITY 　　An integer literal whose　value 　　is the upper bound of the　range 　　for the subtype SYSTEM.PRIORITY.	9
$ILLEGAL_EXTERNAL_FILE_NAME1 　　An　external　file　name　which 　　is　too　long.	(1..256 => 'A')
$ILLEGAL_EXTERNAL_FILE_NAME2 　　An　external　file　name　which 　　contains　invalid　characters.	"/junk/junk"
$INTEGER_FIRST 　　A　universal　integer　literal 　　whose　value　is　INTEGER'FIRST.	-1_073_741_823

TEST PARAMETERS

Name and Meaning	Value

$INTEGER_LAST
    A universal integer literal
    whose value is INTEGER'LAST.
	1_073_741_823

$INTEGER_LAST_PLUS_1
    A universal integer literal
    whose value is INTEGER'LAST + 1.
	1_073_741_824

$LESS_THAN_DURATION
    A universal real literal that
    lies between DURATION'BASE'FIRST
    and DURATION'FIRST or any value
    in the range of DURATION.
	-75_000.0

$LESS_THAN_DURATION_BASE_FIRST
    A universal real literal that is
    less than DURATION'BASE'FIRST.
	-131_073.0

$LOW_PRIORITY
    An integer literal whose value
    is the lower bound of the range
    for the subtype SYSTEM.PRIORITY.
	0

$MANTISSA_DOC
    An integer literal whose value
    is SYSTEM.MAX_MANTISSA.
	31

$MAX_DIGITS
    Maximum digits supported for
    floating-point types.
	33

$MAX_IN_LEN
    Maximum input line length
    permitted by the implementation.
	120

$MAX_INT
    A universal integer literal
    whose value is SYSTEM.MAX_INT.
	1073741823

$MAX_INT_PLUS_1
    A universal integer literal
    whose value is SYSTEM.MAX_INT+1.
	1_073_741_824

$MAX_LEN_INT_BASED_LITERAL
    A universal integer based
    literal whose value is 2#11#
    with enough leading zeroes in
    the mantissa to be MAX_IN_LEN
    long.
	(1..2 => "2:", 3..117 => '0',
	           118..120 => "11:")

Name and Meaning	Value
$MAX_LEN_REAL_BASED_LITERAL A universal real based literal whose value is 16:F.E: with enough leading zeroes in the mantissa to be MAX_IN_LEN long.	(1..3 => "16:", 4..116 => '0', 117..120 => "F.E:")
$MAX_STRING_LITERAL A string literal of size MAX_IN_LEN, including the quote characters.	(1 => '"', 2..119 => 'A', 120 => '"')
$MIN_INT A universal integer literal whose value is SYSTEM.MIN_INT.	-1073741823
$MIN_TASK_SIZE An integer literal whose value is the number of bits required to hold a task object which has no entries, no declarations, and "NULL;" as the only statement in its body.	128
$NAME A name of a predefined numeric type other than FLOAT, INTEGER, SHORT_FLOAT, SHORT_INTEGER, LONG_FLOAT, or LONG_INTEGER.	NO_SUCH_TYPE_AVAILABLE
$NAME_LIST A list of enumeration literals in the type SYSTEM.NAME, separated by commas.	ADA_ED
$NEG_BASED_INT A based integer literal whose highest order nonzero bit falls in the sign bit position of the representation for SYSTEM.MAX_INT.	16#FFFFFFFE#
$NEW_MEM_SIZE An integer literal whose value is a permitted argument for pragma MEMORY_SIZE, other than $DEFAULT_MEM_SIZE. If there is no other value, then use $DEFAULT_MEM_SIZE.	1_073_741_823

TEST PARAMETERS

Name and Meaning	Value
$NEW_STOR_UNIT An integer literal whose value is a permitted argument for pragma STORAGE_UNIT, other than $DEFAULT_STOR_UNIT. If there is no other permitted value, then use value of SYSTEM.STORAGE_UNIT.	32
$NEW_SYS_NAME A value of the type SYSTEM.NAME, other than $DEFAULT_SYS_NAME. If there is only one value of that type, then use that value.	ADA_ED
$TASK_SIZE An integer literal whose value is the number of bits required to hold a task object which has a single entry with one 'IN OUT' parameter.	128
$TICK A real literal whose value is SYSTEM.TICK.	0.01

APPENDIX D

WITHDRAWN TESTS

Some tests are withdrawn from the ACVC because they do not conform to the Ada Standard. The following 44 tests had been withdrawn at the time of validation testing for the reasons indicated. A reference of the form AI-ddddd is to an Ada Commentary.

a. E28005C: This test expects that the string "-- TOP OF PAGE. --63" of line 204 will appear at the top of the listing page due to a pragma PAGE in line 203; but line 203 contains text that follows the pragma, and it is this text that must appear at the top of the page.

b. A39005G: This test unreasonably expects a component clause to pack an array component into a minimum size (line 30).

c. B97102E: This test contains an unintended illegality: a select statement contains a null statement at the place of a selective wait alternative (line 31).

d. C97116A: This test contains race conditions, and it assumes that guards are evaluated indivisibly. A conforming implementation may use interleaved execution in such a way that the evaluation of the guards at lines 50 and 54 and the execution of task CHANGING_OF_THE_GUARD results in a call to REPORT.FAILED at one of lines 52 or 56.

e. BC3009B: This test wrongly expects that circular instantiations will be detected in several compilation units even though none of the units is illegal with respect to the units it depends on; by AI-00256, the illegality need not be detected until execution is attempted (line 95).

f. CD2A62D: This test wrongly requires that an array object's size be no greater than 10 although its subtype's size was specified to be 40 (line 137).

g. CD2A63A..D, CD2A66A..D, CD2A73A..D, and CD2A76A..D (16 tests): These

tests wrongly attempt to check the size of objects of a derived type (for which à 'SIZE length clause is given) by passing them to a derived subprogram (which implicitly converts them to the parent type (Ada standard 3.4:14)). Additionally, they use the 'SIZE length clause and attribute, whose interpretation is considered problematic by the WG9 ARG.

h. CD2A81G, CD2A83G, CD2A84M..N, and CD50110 (5 tests): These tests assume that dependent tasks will terminate while the main program executes a loop that simply tests for task termination; this is not the case, and the main program may loop indefinitely (lines 74, 85, 86, 96, and 58, respectively).

i. CD2B15C and CD7205C: These tests expect that a 'STORAGE_SIZE length clause provides precise control over the number of designated objects in a collection; the Ada standard 13.2:15 allows that such control must not be expected.

j. CD2D11B: This test gives a SMALL representation clause for a derived fixed-point type (at line 30) that defines a set of model numbers that are not necessarily represented in the parent type; by Commentary AI-00099, all model numbers of a derived fixed-point type must be representable values of the parent type.

k. CD5007B: This test wrongly expects an implicitly declared subprogram to be at the address that is specified for an unrelated subprogram (line 303).

l. ED7004B, ED7005C..D, and ED7006C..D (5 tests): These tests check various aspects of the use of the three SYSTEM pragmas; the AVO withdraws these tests as being inappropriate for validation.

m. CD7105A: This test requires that successive calls to CALENDAR.CLOCK change by at least SYSTEM.TICK; however, by Commentary AI-00201, it is only the expected frequency of change that must be at least SYSTEM.TICK--particular instances of change may be less (line 29).

n. CD7203B and CD7204B: These tests use the 'SIZE length clause and attribute, whose interpretation is considered problematic by the WG9 ARG.

o. CD7205D: This test checks an invalid test objective: it treats the specification of storage to be reserved for a task's activation as though it were like the specification of storage for a collection.

p. CE2107I: This test requires that objects of two similar scalar types be distinguished when read from a file--DATA_ERROR is expected to be raised by an attempt to read one object as of the other type. However, it is not clear exactly how the Ada standard 14.2.4:4 is to be interpreted; thus, this test objective is not considered valid (line 90).

q. CE3111C: This test requires certain behavior, when two files are associated with the same external file, that is not required by the Ada standard.

r. CE3301A: This test contains several calls to END_OF_LINE and END_OF_PAGE that have no parameter: these calls were intended to specify a file, not to refer to STANDARD_INPUT (lines 103, 107, 118, 132, and 136).

s. CE3411B: This test requires that a text file's column number be set to COUNT'LAST in order to check that LAYOUT_ERROR is raised by a subsequent PUT operation. But the former operation will generally raise an exception due to a lack of available disk space, and the test would thus encumber validation testing.